

REMARKS/ARGUMENTS

In the Office Action mailed March 23, 2009, claims 1, 2, 4-8, and 10-14 were rejected. Additionally, claims 3 and 9 were objected to, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response, Applicant hereby requests reconsideration of the application in view of the amendments and the below-provided remarks. No claims are canceled.

For reference, claims 1, 8, and 14 are amended to recite each of the two magnetic field detecting sensors generates an output signal. These amendments are supported, for example, by the subject matter described in the specification at least at page 5, lines 4-5.

Additionally, claims 15-17 are added to recite the output signals from the two magnetic field detecting sensors include a first output signal from a first magnetic field detecting sensor and a second output signal from a second magnetic field detecting signal. Also, claims 15-17 recite the magnetoresistive speed sensor is further configured to calculate a differential signal of the first and second magnetic field detecting sensors based on the first and second output signals. These amendments are supported, for example, by the subject matter described in the specification at least at page 5, lines 6-10.

Allowable Subject Matter

Applicant appreciates the Examiner's review of the claims and determination that claims 3 and 9 recite allowable subject matter. In particular, the Office Action states that claims 3 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections under 35 U.S.C. 102

Claims 1, 2, 4-8, and 10-14 were rejected under 35 U.S.C. 102(b) as being anticipated by Butzmann (U.S. Pat. Pub. No. 2002/0175678, hereinafter Butzmann). However, Applicant respectfully submits that these claims are patentable over Butzmann for the reasons provided below.

Independent Claim 1

Claim 1 is patentable over Butzmann because Butzmann does not disclose all of the limitations of the claim. Claim 1 recites:

A magnetoresistive speed sensor comprising a permanent magnet and a magnetic field detecting sensor for detecting the speed of an object rotating about an x-axis, wherein the magnetoresistive speed sensor has a measuring direction, characterized in that the measuring direction is aligned parallel with the x-direction, and two magnetic field detecting sensors are disposed on a y-axis essentially in the direction of the movement of the nearest portion of the object at a distance from one another and perpendicular to the measuring direction, wherein each of the two magnetic field detecting sensors generates an output signal.

Claim 1, emphasis added.

The claim recites two magnetic field detecting sensors, and that the two sensors are disposed a distance from one another. Butzmann does not disclose either of these limitations.

1. Butzmann does not disclose two sensors.

The claim recites “two magnetic field detecting sensors” (emphasis added) and that “each of the two magnetic field detecting sensors generates an output signal” (emphasis added). In contrast, Butzmann does not disclose two magnetic field detecting sensors that each generate an output signal. Butzmann merely discloses a single sensor element with a single output. Paragraphs 31-32 describe the sensor element as a single sensor element (“the sensor element 20,” Butzmann, paragraph 31) with a single output (“the output signal of the sensor element,” Butzmann, paragraph 32).

The Office Action asserts that Butzmann purportedly discloses two sensors in the form of “Wheatstone 20 half bridges (first and third branches being one half, second and fourth branches being second half bridge) on left and right of 50 (symmetrically in relation to x- on y-axis. See Fig. 2.” Office Action, paragraph 2.

Butzmann does not disclose the use of a half bridge Wheatstone bridge. Even if Butzmann did disclose the use of a half bridge Wheatstone bridge, a half bridge Wheatstone bridge does not constitute two sensors. Butzmann merely states that “The sensor is then conventionally operated in front of a gear-wheel of a magnetizable

material, with four resistors connected in a Wheatstone bridge configuration.”

Butzmann, paragraph 6. In other words, the sensor includes a Wheatstone bridge made up of four resistors.

Wheatstone bridges are used in many applications. Figure 1 of the present application describes a Wheatstone bridge, and a portion of Figure 1 of the present application is depicted below as Figure 1. In general, a Wheatstone bridge includes four resistors (R1, R2, R3, and R4) and detects variations in resistance in one or more of the resistors by measuring the output signal U_{out} .

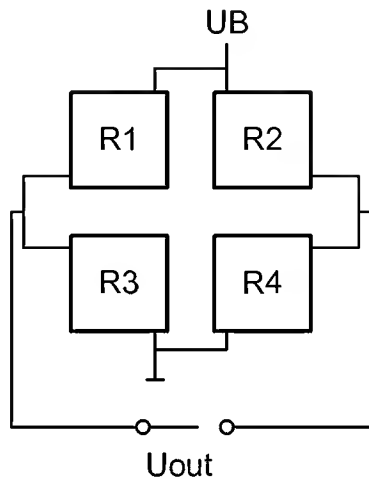


Figure 1

A “half bridge” Wheatstone bridge is simply a Wheatstone bridge in which the resistances of two of the resistors (for example, R3 and R4) are variable. Through proper design of the sensor, a half bridge may be more sensitive and/or less prone to error than a Wheatstone bridge having one variable resistor (a “quarter bridge”). The term, “half bridge,” is somewhat misleading, as the sensor still requires four resistive elements (R1-R4) and has a single output (U_{out}). A Wheatstone bridge cannot be divided into two independent half bridges capable of generating two independent outputs. In other words, a Wheatstone bridge in a half bridge configuration is not two sensors; a half bridge Wheatstone bridge is a single sensor that uses changes in two resistive elements to generate a single output signal. This single output signal conforms to the language used in Butzmann indicating that the single sensor element generates a single output signal (“the output signal of the sensor element 20.” Butzmann, paragraph 32.)

Butzmann does not disclose the use of a half bridge Wheatstone bridge. Even if Butzmann disclosed a Wheatstone bridge in half bridge configuration, a half bridge Wheatstone bridge does not constitute two sensors. Consequently, Butzmann does not disclose all of the limitations of claim 1, which recites two sensors. Accordingly, Applicant respectfully asserts claim 1 is patentable over Butzmann because Butzmann does not disclose all of the limitations of the claim.

2. Butzmann does not disclose two sensors disposed a distance from one another.

Even if Butzmann were to disclose two sensors, Butzmann does not disclose two sensors disposed a distance from one another. The claim recites “two magnetic field detecting sensors are disposed on a y-axis essentially in the direction of the movement of the nearest portion of the object at a distance from one another.” Emphasis added. In contrast, Butzmann does not describe a distance between sensors. Rather, Butzmann describes a single sensor made up of four resistors. Butzmann, paragraph 6. Neither the Figures nor the text of Butzmann indicate that sensors or components of a sensor are disposed at any distance apart. Figure 2 merely depicts a sensor element 20 made up of four boxes disposed immediately adjacent to one another.

Butzmann does not disclose two sensors disposed a distance from one another. Consequently Butzmann does not disclose all of the limitations of claim 1, which recites two sensors disposed a distance from one another. Accordingly, Applicant respectfully asserts claim 1 is patentable over Butzmann because Butzmann does not disclose all of the limitations of the claim.

Independent Claim 8

Applicant respectfully asserts independent claim 8 is patentable over Butzmann at least for similar reasons to those stated above in regard to the rejection of independent claim 1. Claim 8 recites:

A magnetoresistive speed sensor comprising a permanent magnet and a magnetic field detecting sensor for detecting the speed of an object rotating about an x-axis, wherein

the magnetoresistive speed sensor has a measuring direction, characterized in that the measuring direction is aligned parallel with the x-direction, and two magnetic

field detecting sensors are disposed at a distance from one another symmetrically in relation to the x-axis on the y-axis and perpendicular to the measuring direction, wherein each of the two magnetic field detecting sensors generates an output signal.

Claim 8, emphasis added.

Here, although the language of claim 8 differs from the language of claim 1, and the scope of claim 8 should be interpreted independently of claim 1, Applicant respectfully asserts that the remarks provided above in regard to the rejection of claim 1 also apply to the rejection of claim 8. Accordingly, Applicant respectfully asserts claim 8 is patentable over Butzmann because Butzmann does not disclose two sensors, and additionally, Butzmann does not disclose two sensors disposed at a distance from one another, as recited in the claim.

Independent Claim 14

Applicant respectfully asserts independent claim 14 is patentable over Butzmann at least for similar reasons to those stated above in regard to the rejection of independent claim 1.

Claim 14 recites:

A magnetoresistive speed sensor comprising,
a permanent magnet having a magnetic field component in the x-direction; and
a magnetic field detecting sensor for detecting the speed of an object rotating about an x-axis, the magnetic field detecting sensor being a Wheatstone bridge, wherein
the magnetoresistive speed sensor has a measuring direction, characterized in that the measuring direction is aligned parallel with the x-direction, and two magnetic field detecting sensors are disposed at a distance from one another symmetrically in relation to the x-axis on the y-axis and perpendicular to the measuring direction, wherein each of the two magnetic field detecting sensors generates an output signal.

Claim 14, emphasis added

Here, although the language of claim 14 differs from the language of claim 1, and the scope of claim 14 should be interpreted independently of claim 1, Applicant respectfully asserts that the remarks provided above in regard to the rejection of claim 1 also apply to the rejection of claim 14. Accordingly, Applicant respectfully asserts claim

14 is patentable over Butzmann because Butzmann does not disclose two sensors, and additionally, Butzmann does not disclose two sensors disposed at a distance from one another, as recited in the claim.

Dependent Claims

Claims 2-7, 9-13, and 15-17 depend from and incorporate all of the limitations of the corresponding independent claims 1, 8, and 14. Applicant respectfully asserts claims 2-7, 9-13, and 15-17 are allowable based on allowable base claims. Additionally, each of claims 2-7, 9-13, and 15-17 may be allowable for further reasons.

CONCLUSION

Applicant respectfully requests reconsideration of the claims in view of the amendments and the remarks made herein. A notice of allowance is earnestly solicited.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-4019** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-4019** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted,

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